FORM PTO-1390 (REV. 5-93)	U.S DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTORNEY'S DOCKET NUMBER 10191/2270

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

U S. APPLICATION NO. (If known, see 37 CFR 1.5)
10/069166

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE(S) CLAIMED
PCT/DE00/02681	(10.08.00) 10 August 2000	(19 08 99) 19 August 1999

TITLE OF INVENTION
CAR RADIO HAVING A MEMORY FOR AUDIO SIGNALS

APPLICANT(S) FOR DO/EO/US

COON, Matthew and BROECKEL, Friedhelm

Applicant(s) herewith submit to the United States Designated/Elected Office (DO/EO/US) the following items and other information

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U S C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)) immediately rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
   a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☒ has been transmitted by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US)
6. ☒ A translation of the International Application into English (35 U S C. 371(c)(2)).
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U S.C. 371(c)(3))
   a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ have been transmitted by the International Bureau.
   c. ☐ have not been made, however, the time limit for making such amendments has NOT expired.
   d. ☒ have not been made and will not be made.
8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S C. 371(c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C 371(c)(4)) (unsigned).
10. ☒ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U S C 371(c)(5)).

Items 11. to 16. below concern other document(s) or information included:

11. ☒ An Information Disclosure Statement under 37 CFR 1 97 and 1 98.
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A **FIRST** preliminary amendment.
    ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
14. ☒ A substitute specification and a marked up version thereof
15. ☐ A change of power of attorney and/or address letter.
16. ☒ Other items or information: International Search Report (translated), International Preliminary Examination Report (translated), and Form PCT/RO/101

Express Mail No. EL594613900

U.S. APPLICATION NO if known, see 37 C.F.R.	INTERNATIONAL APPLICATION NO	ATTORNEY'S DOCKET NUMBER
10/069166	PCT/DE00/02681	10191/2270

17. ☒ The following fees are submitted:	CALCULATIONS	PTO USE ONLY
Basic National Fee (37 CFR 1.492(a)(1)-(5)): Search Report has been prepared by the EPO or JPO $890.00		
International preliminary examination fee paid to USPTO (37 CFR 1 482) . . . $710.00		
No international preliminary examination fee paid to USPTO (37 CFR 1 482) but international search fee paid to USPTO (37 CFR 1.445(a)(2)) $740.00		
Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO $1,040.00		
International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4) $100.00		
ENTER APPROPRIATE BASIC FEE AMOUNT =	$ 890	
Surcharge of $130.00 for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492(e))	$	

Claims	Number Filed	Number Extra	Rate		
Total Claims	5 - 20 =	0	X $18.00	$	
Independent Claims	1 - 3 =	0	X $84.00	$	
Multiple dependent claim(s) (if applicable)			+ $280.00	$	
TOTAL OF ABOVE CALCULATIONS =				$890	
Reduction by 1/2 for filing by small entity, if applicable. Verified Small Entity statement must also be filed. (Note 37 CFR 1.9, 1.27, 1 28)				$	
SUBTOTAL =				$890	
Processing fee of $130.00 for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1 492(f)). +				$	
TOTAL NATIONAL FEE =				$890	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). $40.00 per property +				$	
TOTAL FEES ENCLOSED =				$890	
				Amount to be: refunded	$
				charged	$

a. ☐ A check in the amount of $_____ to cover the above fees is enclosed.

b. ☒ Please charge my Deposit Account No. 11-0600 in the amount of $890.00 to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 11-0600. A duplicate copy of this sheet is enclosed

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

By: Reg No 35,982

SEND ALL CORRESPONDENCE TO:

SIGNATURE

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2/19/02
DATE

[10191/2270]

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s)	:	Matthew COON et al.
Serial No.	:	To Be Assigned
Filed	:	Herewith
For	:	CAR RADIO HAVING A MEMORY FOR AUDIO SIGNALS
Examiner	:	To Be Assigned
Art Unit	:	To Be Assigned

Assistant Commissioner
for Patents
Washington, D.C. 20231

PRELIMINARY AMENDMENT

SIR:

Kindly amend the above-identified application before examination, as set forth below.

IN THE SPECIFICATION:

Please amend the specification, including abstract, pursuant to the attached substitute specification. Also attached is a marked up copy of the specification, indicating deleted and added sections. No new matter has been added.

IN THE CLAIMS:

Please cancel original claims 1-6 and please cancel substitute claims 1-5, without prejudice.

Please add the following new claims:

6. (New) A car radio comprising:

EL594613900

a memory in the form of a hard disk for storing audio signals in one of a compressed form and an uncompressed form;

a decompression stage; and

an additional code detector stage for determining whether the audio signals are stored in compressed form or uncompressed form, and, if the audio signals are stored in compressed form, for transmitting the audio signals to the decompression stage for output.

7. (New) The car radio according to claim 6, wherein the memory is adapted to be removed from the car radio.

8. (New) The car radio according to claim 6, further comprising a reading device for additional storage media for transcribing audio signals stored on at least one additional storage media to the memory.

9. (New) The car radio according to claim 8, further comprising a coder for compressing audio data read from a storage medium for storage in the memory, the coder being coupled between the reading device and the memory.

10. (New) The car radio according to claim 6, wherein the memory is integrated into the car radio.

REMARKS

This Preliminary Amendment cancels, without prejudice, claims 1-5 in the underlying PCT Application No. PCT/DE00/02681. This Preliminary Amendment also cancels, without prejudice, claims 1-5 in the annex of the International Preliminary Examination Report, and adds new claims 6-10. The new claims conform the claims to the U.S. Patent and Trademark Office rules and does not add new matter to the application.

The amendments to the specification and abstract reflected in the substitute specification are to conform the specification and abstract to U.S. Patent and Trademark Office rules, and do not introduce new matter into the application.

The underlying PCT Application No. PCT/DE00/02681 includes an International Search Report, issued July 19, 2001, a copy of which is included. The Search Report includes a list of documents that were considered by the Examiner in the underlying PCT application.

The underlying PCT Application No. PCT/DE00/02681 also includes an International Preliminary Examination Report, issued November 27, 2001. A translation of the International Preliminary Examination Report and annex thereto is included herewith.

It is respectfully submitted that the present invention is new, non-obvious, and useful. Prompt consideration and allowance of the claims are respectfully requested.

Respectfully Submitted,

KENYON & KENYON

Dated: 2/19/02

By: [signature] (Reg. No. 35,982)

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CAR RADIO HAVING A MEMORY FOR AUDIO SIGNALS

Field Of The Invention

The present invention relates to a car radio having a memory in which audio signals may be stored.

Background Information

Car radios having a memory in which audio signals can be stored are known, for instance, in the form of car radios having a memory for recording traffic reports from an on-air radio program. The device, Type "New York RDM 127," from Blaupunkt-Werke GmbH, Hildesheim, for example, is such a car radio and is described in the brochure as "Der Pluspunkt im Auto. Mobile Kommunikation 1999. [The plus point in the car. Mobile Communication 1999.]" The memory of the device mentioned is designed to store up to four traffic reports lasting a total of four minutes. Due to the low scanning frequency for the audio signal, the memory is only suited for voice recordings. The device mentioned also has a compact disk (CD) player, which is capable of playing commercial audio-CDs.

In addition, CD-burners that can be connected to PCs are known, such as from the magazine "Plus," Issue 6/99, with which the user can record pieces of music, for instance, on blank CDs (CD-Rs or CD-RWs) using special software on the PC. The CDs burned by the user can be played back in an essentially known manner in the same way as commercial music CDs on a conventional CD player. For the purpose of copying at least individual pieces of music from an audio-CD to a CD-R or CD-RW, the software creates an image file on the hard disk of the PC, which contains the pieces of music to be copied. The music data contained in the image file are then recorded onto a CD, but may also be played back using the PC.

Furthermore, the possibility is known, such as from the magazine "Plus," Issue 6/99, of compressing audio signals available in digital form, especially pieces of music, using the MPEG1 Layer 3 (MP3) standard, in other words reducing their data volume. Also known from the mentioned magazine are playback devices for audio data compressed according to the MP3-standard such as in the form of portable playback devices or a PC equipped with the appropriate decoding software, on the hard disk of which PC the audio data are storable.

Finally, a device is known in the form of Clarion's car-PC, described in the magazine "Plus," Issue 7/99, which combines in one housing both the functionality of a car radio and that of a computer. The device not only has a slot for inserting compact-flash-cards as data media, but also a CD-ROM drive, via which additional software can be loaded or music CDs can be played back.

Summary Of The Invention

The car radio according to the present invention has the advantage that a memory is provided having an especially high recording capacity in the form of a hard disk used as memory for audio – especially music – signals.

Even without special data compression methods, a conventional computer hard disk having a currently common storage capacity of 8 gigabytes can store music data of at least 15 hours' duration at a data volume of approximately 8.8 megabytes per minute, common for conventional CDs, in CD-quality. Therefore, the use of a hard disk as an audio-signal storage medium for a car radio has the advantage that for the vast majority of car trips a change of the data medium – such as about every hour in the case of CDs or every hour-and-a-half in the case of cassettes, in other words after completed playback – is no longer necessary. This eliminates the distraction of the driver and thus a potential endangerment of the driver himself

and other road users, caused by changing a data medium while driving.

This is particularly true when using a compression method such as MP3 for storing audio data in the memory of the car radio where, in the case of MP3, the capacity of the hard disk increases by a factor of 10 to 150 hours of music data, which corresponds to a capacity of approximately 128 CDs at an assumed mean playback time of 70 minutes per CD. In this way, an entire audio-CD collection, or at least considerable portions of such a collection, are able to be stored on a conventional hard disk. A change of storage medium may therefore not be required at all.

Another advantage can be seen in the fact that a commercial hard disk has smaller external dimensions compared to a conventional CD-drive, making the integration of the storage medium into a car radio, with its small external dimensions common today and determined by the standard radio installation slot, less cumbersome.

Compared to a known externally connectable CD-changer for car radios, a CD-player for multiple CDs stored in a magazine, the hard-disk method also has the advantage of having significantly smaller dimensions with at least comparable or, in the case of MP3-compressed audio data, significantly larger capacity. Furthermore, a hard disk is cheaper to produce than a CD-changer and less susceptible to wear due to a smaller number of mechanical components.

When storing audio data in the memory of the car radio, it is advantageous if the memory, such as in the form of an exchangeable hard disk known from PCs, is removable from the car radio or is disconnectable from it, and is connectable to a data source, such as a PC or a home audio system.

Furthermore, for storing audio data in the memory of the car

radio, it is advantageous if the memory includes a reading device for other storage media that are connected to the memory for transcribing audio signals stored on another storage medium to the memory. In this case, the hard disk can permanently remain in the car radio or connected to it if installed externally. This is particularly advantageous if the hard disk is either permanently installed in the car radio or in another part of the car such as behind an interior trim panel.

Especially in the case of a hard disk that cannot be removed or disconnected from the car radio at all or only with great difficulty, it is particularly advantageous if a coder is connectable between the reading device and the memory for the purpose of compressing audio data read from a storage medium for storing them in the memory. In this case, when storing the audio data in the memory in compressed form, the storage media to be analyzed by the reading device do not necessarily have to contain the data in compressed form. Rather, the compression may take place in the car radio, so that even conventional audio-CDs may be used as data media. The reading device does not have to be suited for reading storage media with compressed audio data either; a common CD-player, for instance, suffices.

A decoder, installed downstream from the memory, for converting the MP3-coded audio data permits their conversion into reproducible audio signals.

Brief Description Of The Drawings

Figure 1 shows a block diagram of the part important to the invention of a car radio according to the present invention.

Figure 2 shows a block diagram of a memory for recording audio data, having a coder that may be installed upstream for data compression.

Figure 3 shows a block diagram of a memory for recording audio data, having a decoder that may be installed downstream for converting audio data stored in compressed form into reproducible audio signals.

Detailed Description

An advantageous embodiment of a car radio 1 according to the present invention is shown schematically in Figure 1 in the form of a block diagram.

Car radio 1 according to the present invention has a radio receiver 20, that is essentially known and therefore not further described, which receiver includes the means necessary for receiving and demodulating a radio signal. At the output of radio receiver 20, a radio program signal in the form of a stereo multiplex signal is available, obtained from a received radio transmit frequency by demodulation, containing audio signals for the left and the right audio channel.

The radio program signal, in other words the audio signal to be reproduced, is fed to a first input of a controllable switch 60. When switch 60 is appropriately triggered by a trigger signal, the radio program signal is able to be picked up at the output of controllable switch 60.

The output of controllable switch 60 is connected to an essentially known playback device 50 for audio signals. This device includes – as is generally known – the means required for playback of an audio signal, such as a stereo decoder for isolating the left and right channels of the audio signal from the stereo multiplex signal, a sound-control device for manipulating the frequency response of the audio signal, such as in the form of an equalizer, a volume adjuster, one or more low-frequency amplifiers, and loudspeakers for playing back the supplied audio signal.

Additionally, the car radio has a control unit 40 that

includes control elements 45 such as in the form of pushbuttons, rotary buttons or cursor control keys, for controlling its functions, as well as a display unit 70 for displaying its operational state, for instance, the name of a radio program currently received by the radio receiver. In the case of cursor control of the car radio, using cursor keys 45, display unit 70 is also used for displaying a cursor against the background of a one or multidimensional menu, from which functions and parameters of the car radio are selectable or adjustable via the cursor.

Finally, according to the present invention, the car radio includes a memory 10 for audio data in the form of a hard disk. The audio data stored on the hard disk may be read in response to a corresponding control signal and fed to the second input of controllable switch 60. When a corresponding control signal is applied to switch 60, the switch establishes a connection between its second input and its output, and thus with playback unit 50, so that the audio signals read out from memory 10 are played back. The hard disk may either be integrated into the car radio or be connected to it as an external device.

Above-mentioned elements 10, 20, 40, 50, 60, 70 communicate with a control 30 for controlling the functions of the device. The control is used, for instance,

- for converting user inputs at control unit 40 into control sequences for controlling the above-mentioned elements of the device,
- for detecting operating states of individual components of the device and for generating operational state information displayable at display unit 70; in other words, for MMI-functions of the device, as well as
- for controlling internal sequences and functions of car radio 1.

Functions controlled by control 30 are, for instance,

- the determination of a radio transmit frequency assigned to the program in a program and frequency memory, and setting of the transmit frequency as the receive frequency at radio receiver 20, after selection of a desired radio program by the user via control unit 40,
- determination of an alternative, clearer radio transmit frequency transmitting the same program, and setting of this transmit frequency as the receive frequency at the radio receiver, in the case of a worsening of the reception of a selected receive frequency,
- display of the received radio program as a function of RDS-data or the selected frequency,
- generation of a control signal for switch 60 as a function of a user input via control unit 40, or during standby operation for receiving traffic information in case of playback of an audio signal from memory 10, when a traffic announcement is detected in the received radio program for preferential playback of the traffic announcement over playback of the audio signals from memory 10,
- generation of control signals for memory 10 for storing audio data in the memory for reading out of audio data from the memory in response to a corresponding user input via control unit 40,
- generation of control signals for manipulating the playback volume or the frequency response for an audio signal to be played back via the volume control or the equalizer of playback unit 50 in response to corresponding user inputs at control unit 40.

Memory 10 of car radio 1 according to the present invention is configured according to a particularly advantageous embodiment of the present invention as a hard disk, removable from the car radio, such as the kind of exchangeable hard disk known from personal computers. For this purpose it is equipped with detachable terminals 12 and 13 for connection to control 30 and to the second input of controllable switch 60, which

terminals are advantageously arranged in a multipole connector in such a way that, when inserting hard disk 10 into car radio 1, terminals 12 and 13 automatically establish an electrical connection with corresponding counter-contacts of car radio 1.

When removed from the car radio, hard disk 10 may be connected via another terminal 11 – in the following also referred to as an input terminal – to an audio signal system such as a home stereo system for transcribing audio data to the hard disk. It may also be possible, however, to insert hard disk 10 into a PC for recording with audio data. For instance, a music CD inserted into a CD-ROM drive of a PC may be read out and the audio data stored there recorded on the hard disk. In this way, the user of the car radio, before going on a trip, may, for instance, transcribe a desired portion of his music-CD collection to the hard disk and listen to it during the trip. Here, the transcription of even larger quantities of data to the hard disk takes relatively little time due to the high reading speeds of today's CD-ROM drives and the high recording speeds of today's hard disks.

According to a further embodiment of the car radio, the latter has a reading device for additional storage media such as in the form of a CD-player. The CD-player's output is connected to the input of memory 10, in other words the hard disk, or connectable via a terminal 11, so that audio data, read-out from an audio-CD inserted in CD-player 80, can be transcribed to hard disk 10. This makes it possible for the user of the car radio, before going on a trip, for instance, to transcribe a portion of his CD collection to the hard disk, that can then be listened to during the trip. Transcription of audio data to the hard disk is accelerated by a fast CD-player. Fast CD-players are available in the form of PC CD-ROM drives with currently up to 40x reading speeds.

In another advantageous embodiment – described below using Figure 2 – of the car radio according to the present

invention, a compression stage 17 is or may be connected upstream from memory 10. This compression stage may be permanently looped into the signal path between additional terminal 11 of memory 10 and hard disk 15 or, as in the present case, may be capable of being looped into the signal path if need be. Compression stage 17 is used for compressing audio signal data supplied via additional terminal 11 of memory 10, such as according to the MP3-standard. This stores audio data in compressed form on hard disk 15 as the actual data memory.

In the case of the present embodiment, additional terminal 11 of memory 10 is connected to a code detector stage 16, which checks the data signal present at additional terminal 11 to see whether the signal is already compressed. For instance, if a PC is the source of the audio data, the audio data downloaded from the Internet may, for instance, already be in the MP3-format. On the other hand, when transcribing audio data from a standard audio CD to memory 10, the data is in uncompressed form. If the audio data are available in compressed form, code detector stage 16 feeds the signal present at additional terminal 11 directly to the hard disk 15 for storage. Otherwise, if the audio data signal at additional terminal 11 is available in uncompressed form, code detector stage 16 feeds it to compression stage 17 for compression and subsequent storage in compressed form on hard disk 15.

In response to a control command at control terminal 12 of memory 10, the audio data signal stored in compressed form on hard disk 15 are read by the hard disk and fed to a decompression stage 18, which converts the compressed audio data signal into a decompressed audio data signal that may be picked up at output terminal 13 of the memory and fed to the playback device.

The embodiment of memory 10 shown in Figure 3 provides for the possibility of feeding the memory, via input terminal 11,

uncompressed audio data signals such as those originating from a CD-player 80, as well as, for instance, audio data signals compressed according to the MP3-standard. These are stored unchanged on hard disk 15.

In this embodiment, hard disk 15 is connected on the output side to an additional code detector stage 19, which is comparable to code detector stage 16, which code detector stage 19 checks an audio data signal read by hard disk 15 to see whether the signal is in compressed or uncompressed form. If the audio data signal is available in compressed form, it is fed to a decompression stage 18 for decompression. The decompressed audio data signal may then be picked up at output terminal 13 of memory 10. Otherwise, if the audio data are present in uncompressed form on hard disk 15, they are fed directly to output terminal 13 of memory 10 while being read by additional code detector stage 19.

Code detector stages 16 and 19, as well as coder and decoder 17, 18, may be configured as part of memory 10 and thus be removable from the car radio together with memory 10, especially in the case of a memory 10 that is removable or disconnectable from car radio 1 as shown in Figures 2 and 3. In this case, terminals 11 and 13, as in the embodiment in Figure 2, are situated in the signal path upstream from code detector 16, or downstream from decoder 18, or in the embodiment in Figure 3, upstream from hard disk 15 or downstream from code detector 19 and decoder 18.

Above-mentioned elements 16 through 19 may also be configured as a part of the car radio itself and therefore remain in the radio even when disconnecting memory 10 from it. In that case, terminals 11 and 13 are located between code detector 16 and memory 10, which then is identical to hard disk 15, or between hard disk 15 and decoder 18 or additional code detector 19.

Abstract Of The Disclosure

A car radio has a memory in which audio signals may be stored, where the memory is configured in the form of a hard disk. A hard disk as an audio signal memory offers the advantage of high storage capacity of about 15 hours of audio signal in CD-quality, with today's hard disks of about 8-gigabyte, while at the same time having small dimensions and low production costs.

CAR RADIO HAVING A MEMORY FOR AUDIO SIGNALS

Field Of The Invention

The present invention relates to a car radio having a memory in which audio signals may be stored.

Background Information

[The invention is based on a car radio having a memory in which audio signals may be stored, according to the definition of the species in the independent claim.

]Car radios having a memory in which audio signals can be stored are known, for instance, in the form of car radios having a memory for recording traffic reports from an on-air radio program. The device, Type "New York RDM 127," from Blaupunkt-Werke GmbH, Hildesheim, for example, is such a car radio and is described in the brochure as "Der Pluspunkt im Auto. Mobile Kommunikation 1999. [The plus point in the car. Mobile [communication] Communication 1999.]" The memory of the device mentioned is designed to store up to four traffic reports lasting a total of four minutes. Due to the low scanning frequency for the audio signal, the memory is only suited for voice recordings. The device mentioned also has a compact disk (CD) player, which is capable of playing commercial audio-CDs.

In addition, CD-burners that can be connected to PCs are known, such as from the magazine "Plus," Issue 6/99, with which the user can record pieces of music, for instance, on blank CDs (CD-Rs or CD-RWs) using special software on the PC. The CDs burned by the user can be played back in an essentially known manner in the same way as commercial music CDs on a conventional CD player. For the purpose of copying at

least individual pieces of music from an audio-CD to a CD-R or CD-RW, the software creates an image file on the hard disk of the PC, which contains the pieces of music to be copied. The music data contained in the image file are then recorded onto a CD, but may also be played back using the PC.

Furthermore, the possibility is known, such as from the magazine "Plus," Issue 6/99, of compressing audio signals available in digital form, especially pieces of music, using the MPEG1 Layer 3 (MP3) standard, in other words reducing their data volume. Also known from the mentioned magazine are playback devices for audio data compressed according to the MP3-standard such as in the form of portable playback devices or a PC equipped with the appropriate decoding software, on the hard disk of which PC the audio data are storable.

Finally, a device is known in the form of Clarion's car-PC, described in the magazine "Plus," Issue 7/99, which combines in one housing both the functionality of a car radio and that of a computer. The device not only has a slot for inserting compact-flash-cards as data media, but also a CD-ROM drive, via which additional software can be loaded or music CDs can be played back.

[Advantages of the] Summary Of The Invention

The car radio according to the present invention [having the features of the independent claim] has the advantage that a memory is provided having an especially high recording capacity in the form of a hard disk used as memory for audio – especially music – signals.

Even without special data compression methods, a conventional computer hard disk having a currently common storage capacity of 8 gigabytes can store music data of at least 15 hours' duration at a data volume of [approx.] approximately 8.8 megabytes per minute, common for conventional CDs, in

CD-quality. Therefore, the use of a hard disk as an audio-signal storage medium for a car radio has the advantage that for the vast majority of car trips a change of the data medium – such as about every hour in the case of CDs or every hour-and-a-half in the case of cassettes, in other words after completed playback – is no longer necessary. This eliminates the distraction of the driver and thus a potential endangerment of the driver himself and other road users, caused by changing a data medium while driving.

This is particularly true when using a compression method such as MP3 for storing audio data in the memory of the car radio where, in the case of MP3, the capacity of the hard disk increases by a factor of 10 to 150 hours of music data, which corresponds to a capacity of approximately 128 CDs at an assumed mean playback time of 70 minutes per CD. In this way, an entire audio-CD collection, or at least considerable portions of such a collection, are able to be stored on a conventional hard disk. A change of storage medium may therefore not be required at all.

Another advantage can be seen in the fact that a commercial hard disk has smaller external dimensions compared to a conventional CD-drive, making the integration of the storage medium into a car radio, with its small external dimensions common today and determined by the standard radio installation slot, less cumbersome.

Compared to a known externally connectable CD-changer for car radios, a CD-player for multiple CDs stored in a magazine, the hard-disk method also has the advantage of having significantly smaller dimensions with at least comparable or, in the case of MP3-compressed audio data, significantly larger capacity. Furthermore, a hard disk is cheaper to produce than a CD-changer and less susceptible to wear due to a smaller number of mechanical components.

When storing audio data in the memory of the car radio, it is advantageous if the memory, such as in the form of an exchangeable hard disk known from PCs, is removable from the car radio or is disconnectable from it, and is connectable to a data source, such as a PC or a home audio system.

Furthermore, for storing audio data in the memory of the car radio, it is advantageous if the memory includes a reading device for other storage media that are connected to the memory for transcribing audio signals stored on another storage medium to the memory. In this case, the hard disk can permanently remain in the car radio or connected to it if installed externally. This is particularly advantageous if the hard disk is either permanently installed in the car radio or in another part of the car such as behind an interior trim panel.

Especially in the case of a hard disk that cannot be removed or disconnected from the car radio at all or only with great difficulty, it is particularly advantageous if a coder is connectable between the reading device and the memory for the purpose of compressing audio data read from a storage medium for storing them in the memory. In this case, when storing the audio data in the memory in compressed form, the storage media to be analyzed by the reading device do not necessarily have to contain the data in compressed form. Rather, the compression may take place in the car radio, so that even conventional audio-CDs may be used as data media. The reading device does not have to be suited for reading storage media with compressed audio data either; a common CD-player, for instance, suffices.

A decoder, installed downstream from the memory, for converting the MP3-coded audio data permits their conversion into reproducible audio signals.

[Drawing

Embodiments of the invention are presented in the figures and are explained in more detail below. Identical symbols represent identical elements.] Brief Description Of The Drawings

Figure 1 shows a block diagram of the part [essential] important to the invention of a car radio according to the present invention[,].

Figure 2 shows a block diagram of a memory for recording audio data, having a coder that may be installed upstream for data compression[, and].

Figure 3 shows a block diagram of a memory for recording audio data, having a decoder that may be installed downstream for converting audio data stored in compressed form into reproducible audio signals.

Detailed Description [of the Exemplary Embodiments]

An advantageous embodiment of a car radio 1 according to the present invention is shown schematically in Figure 1 in the form of a block diagram.

Car radio 1 according to the present invention has a radio receiver 20, that is essentially known and therefore not further described, which receiver includes the means necessary for receiving and demodulating a radio signal. At the output of radio receiver 20, a radio program signal in the form of a stereo multiplex signal is available, obtained from a received radio transmit frequency by demodulation, containing audio signals for the left and the right audio channel.

The radio program signal, in other words the audio signal to be reproduced, is fed to a first input of a controllable switch 60. When switch 60 is appropriately triggered by a

trigger signal, the radio program signal is able to be picked up at the output of controllable switch 60.

The output of controllable switch 60 is connected to an essentially known playback device 50 for audio signals. This device includes – as is generally known – the means required for playback of an audio signal, such as a stereo decoder for isolating the left and right channels of the audio signal from the stereo multiplex signal, a sound-control device for manipulating the frequency response of the audio signal, such as in the form of an equalizer, a volume adjuster, one or more low-frequency amplifiers, and loudspeakers for playing back the supplied audio signal.

Additionally, the car radio has a control unit 40 that includes control elements 45 such as in the form of pushbuttons, rotary buttons or cursor control keys, for controlling its functions, as well as a display unit 70 for displaying its operational state, for instance, the name of a radio program currently received by the radio receiver. In the case of cursor control of the car radio, using cursor keys 45, display unit 70 is also used for displaying a cursor against the background of a one or multidimensional menu, from which functions and parameters of the car radio are selectable or adjustable via the cursor.

Finally, according to the present invention, the car radio includes a memory 10 for audio data in the form of a hard disk. The audio data stored on the hard disk may be read in response to a corresponding control signal and fed to the second input of controllable switch 60. When a corresponding control signal is applied to switch 60, the switch establishes a connection between its second input and its output, and thus with playback unit 50, so that the audio signals read out from memory 10 are played back. The hard disk may either be integrated into the car radio or be connected to it as an

external device.

Above-mentioned elements 10, 20, 40, 50, 60, 70 communicate with a control 30 for controlling the functions of the device. The control is used, for instance,

- for converting user inputs at control unit 40 into control sequences for controlling the above-mentioned elements of the device,
- for detecting operating states of individual components of the device and for generating operational state information displayable at display unit 70; in other words, for MMI-functions of the device, as well as
- for controlling internal sequences and functions of car radio 1.

Functions controlled by control 30 are, for instance,

- the determination of a radio transmit frequency assigned to the program in a program and frequency memory, and setting of the transmit frequency as the receive frequency at radio receiver 20, after selection of a desired radio program by the user via control unit 40,
- determination of an alternative, clearer radio transmit frequency transmitting the same program, and setting of this transmit frequency as the receive frequency at the radio receiver, in the case of a worsening of the reception of a selected receive frequency,
- display of the received radio program as a function of RDS-data or the selected frequency,
- generation of a control signal for switch 60 as a function of a user input via control unit 40, or during standby operation for receiving traffic information in case of playback of an audio signal from memory 10, when a traffic announcement is detected in the received radio program for preferential playback of the traffic announcement over playback of the audio signals from memory 10,

- generation of control signals for memory 10 for storing audio data in the memory for reading out of audio data from the memory in response to a corresponding user input via control unit 40,
- generation of control signals for manipulating the playback volume or the frequency response for an audio signal to be played back via the volume control or the equalizer of playback unit 50 in response to corresponding user inputs at control unit 40.

Memory 10 of car radio 1 according to the present invention is configured according to a particularly advantageous embodiment of the present invention as a hard disk, removable from the car radio, such as the kind of exchangeable hard disk known from personal computers. For this purpose it is equipped with detachable terminals 12 and 13 for connection to control 30 and to the second input of controllable switch 60, which terminals are advantageously arranged in a multipole connector in such a way that, when inserting hard disk 10 into car radio 1, terminals 12 and 13 automatically establish an electrical connection with corresponding counter-contacts of car radio 1.

When removed from the car radio, hard disk 10 may be connected via another terminal 11 – in the following also referred to as an input terminal – to an audio signal system such as a home stereo system for transcribing audio data to the hard disk. It may also be possible, however, to insert hard disk 10 into a PC for recording with audio data. For instance, a music CD inserted into a CD-ROM drive of a PC may be read out and the audio data stored there recorded on the hard disk. In this way, the user of the car radio, before going on a trip, may, for instance, transcribe a desired portion of his music-CD collection to the hard disk and listen to it during the trip. Here, the transcription of even larger quantities of data to the hard disk takes relatively little time due to the high reading speeds of today's CD-ROM drives and the high recording

speeds of today's hard disks.

According to a further embodiment of the car radio, the latter has a reading device for additional storage media such as in the form of a CD-player. The CD-player's output is connected to the input of memory 10, in other words the hard disk, or connectable via a terminal 11, so that audio data, read-out from an audio-CD inserted in CD-player 80, can be transcribed to hard disk 10. This makes it possible for the user of the car radio, before going on a trip, for instance, to transcribe a portion of his CD collection to the hard disk, that can then be listened to during the trip. Transcription of audio data to the hard disk is accelerated by a fast CD-player. Fast CD-players are available in the form of PC CD-ROM drives with currently up to 40x reading speeds.

In another advantageous embodiment – described below using Figure 2 – of the car radio according to the present invention, a compression stage 17 is or may be connected upstream from memory 10. This compression stage may be permanently looped into the signal path between additional terminal 11 of memory 10 and hard disk 15 or, as in the present case, may be capable of being looped into the signal path if need be. Compression stage 17 is used for compressing audio signal data supplied via additional terminal 11 of memory 10, such as according to the MP3-standard. This stores audio data in compressed form on hard disk 15 as the actual data memory.

In the case of the present embodiment, additional terminal 11 of memory 10 is connected to a code detector stage 16, which checks the data signal present at additional terminal 11 to see whether the signal is already compressed. For instance, if a PC is the source of the audio data, the audio data downloaded from the Internet may, for instance, already be in the MP3-format. On the other hand, when transcribing audio

data from a standard audio CD to memory 10, the data is in uncompressed form. If the audio data are available in compressed form, code detector stage 16 feeds the signal present at additional terminal 11 directly to the hard disk 15 for storage. Otherwise, if the audio data signal at additional terminal 11 is available in uncompressed form, code detector stage 16 feeds it to compression stage 17 for compression and subsequent storage in compressed form on hard disk 15.

In response to a control command at control terminal 12 of memory 10, the audio data signal stored in compressed form on hard disk 15 are read by the hard disk and fed to a decompression stage 18, which converts the compressed audio data signal into a decompressed audio data signal that may be picked up at output terminal 13 of the memory and fed to the playback device.

The embodiment of memory 10 shown in Figure 3 provides for the possibility of feeding the memory, via input terminal 11, uncompressed audio data signals such as those originating from a CD-player 80, as well as, for instance, audio data signals compressed according to the MP3-standard. These are stored unchanged on hard disk 15.

In this embodiment, hard disk 15 is connected on the output side to an additional code detector stage 19, which is comparable to code detector stage 16, which code detector stage 19 checks an audio data signal read by hard disk 15 to see whether the signal is in compressed or uncompressed form. If the audio data signal is available in compressed form, it is fed to a decompression stage 18 for decompression. The decompressed audio data signal may then be picked up at output terminal 13 of memory 10. Otherwise, if the audio data are present in uncompressed form on hard disk 15, they are fed directly to output terminal 13 of memory 10 while being read by additional code detector stage 19.

Code detector stages 16 and 19, as well as coder and decoder 17, 18, may be configured as part of memory 10 and thus be removable from the car radio together with memory 10, especially in the case of a memory 10 that is removable or disconnectable from car radio 1 as shown in Figures 2 and 3. In this case, terminals 11 and 13, as in the embodiment in Figure 2, are situated in the signal path upstream from code detector 16, or downstream from decoder 18, or in the embodiment in Figure 3, upstream from hard disk 15 or downstream from code detector 19 and decoder 18.

Above-mentioned elements 16 through 19 may also be configured as a part of the car radio itself and therefore remain in the radio even when disconnecting memory 10 from it. In that case, terminals 11 and 13 are located between code detector 16 and memory 10, which then is identical to hard disk 15, or between hard disk 15 and decoder 18 or additional code detector 19.

Abstract Of The Disclosure

A car radio [is described having] has a memory in which audio signals may be stored, where the memory is configured in the form of a hard disk. [ ]A hard disk as an audio signal memory offers the advantage of high storage capacity of about 15 hours of audio signal in CD-quality, with today's hard disks of about 8-gigabyte, while at the same time having small dimensions and low production costs.

i/prts

CAR RADIO HAVING A MEMORY FOR AUDIO SIGNALS

Background Information

The invention is based on a car radio having a memory in which audio signals may be stored, according to the definition of the species in the independent claim.

Car radios having a memory in which audio signals can be stored are known, for instance, in the form of car radios having a memory for recording traffic reports from an on-air radio program. The device, Type "New York RDM 127," from Blaupunkt-Werke GmbH, Hildesheim, for example, is such a car radio and is described in the brochure as "Der Pluspunkt im Auto. Mobile Kommunikation 1999. [The plus point in the car. Mobile communication 1999.]" The memory of the device mentioned is designed to store up to four traffic reports lasting a total of four minutes. Due to the low scanning frequency for the audio signal, the memory is only suited for voice recordings. The device mentioned also has a compact disk (CD) player, which is capable of playing commercial audio-CDs.

In addition, CD-burners that can be connected to PCs are known, such as from the magazine "Plus," Issue 6/99, with which the user can record pieces of music, for instance, on blank CDs (CD-Rs or CD-RWs) using special software on the PC. The CDs burned by the user can be played back in an essentially known manner in the same way as commercial music CDs on a conventional CD player. For the purpose of copying at least individual pieces of music from an audio-CD to a CD-R or CD-RW, the software creates an image file on the hard disk of the PC, which contains the pieces of music to be copied. The music data contained in the image file are then recorded onto

a CD, but may also be played back using the PC.

Furthermore, the possibility is known, such as from the magazine "Plus," Issue 6/99, of compressing audio signals available in digital form, especially pieces of music, using the MPEG1 Layer 3 (MP3) standard, in other words reducing their data volume. Also known from the mentioned magazine are playback devices for audio data compressed according to the MP3-standard such as in the form of portable playback devices or a PC equipped with the appropriate decoding software, on the hard disk of which PC the audio data are storable.

Finally, a device is known in the form of Clarion's car-PC, described in the magazine "Plus," Issue 7/99, which combines in one housing both the functionality of a car radio and that of a computer. The device not only has a slot for inserting compact-flash-cards as data media, but also a CD-ROM drive, via which additional software can be loaded or music CDs can be played back.

Advantages of the Invention

The car radio according to the present invention having the features of the independent claim has the advantage that a memory is provided having an especially high recording capacity in the form of a hard disk used as memory for audio – especially music – signals.

Even without special data compression methods, a conventional computer hard disk having a currently common storage capacity of 8 gigabytes can store music data of at least 15 hours' duration at a data volume of approx. 8.8 megabytes per minute, common for conventional CDs, in CD-quality. Therefore, the use of a hard disk as an audio-signal storage medium for a car radio has the advantage that for the vast majority of car trips a change of the data medium – such as about every hour in the case of CDs or every hour-and-a-half in the case of

cassettes, in other words after completed playback – is no longer necessary. This eliminates the distraction of the driver and thus a potential endangerment of the driver himself and other road users, caused by changing a data medium while driving.

This is particularly true when using a compression method such as MP3 for storing audio data in the memory of the car radio where, in the case of MP3, the capacity of the hard disk increases by a factor of 10 to 150 hours of music data, which corresponds to a capacity of approximately 128 CDs at an assumed mean playback time of 70 minutes per CD. In this way, an entire audio-CD collection, or at least considerable portions of such a collection, are able to be stored on a conventional hard disk. A change of storage medium may therefore not be required at all.

Another advantage can be seen in the fact that a commercial hard disk has smaller external dimensions compared to a conventional CD-drive, making the integration of the storage medium into a car radio, with its small external dimensions common today and determined by the standard radio installation slot, less cumbersome.

Compared to a known externally connectable CD-changer for car radios, a CD-player for multiple CDs stored in a magazine, the hard-disk method also has the advantage of having significantly smaller dimensions with at least comparable or, in the case of MP3-compressed audio data, significantly larger capacity. Furthermore, a hard disk is cheaper to produce than a CD-changer and less susceptible to wear due to a smaller number of mechanical components.

When storing audio data in the memory of the car radio, it is advantageous if the memory, such as in the form of an exchangeable hard disk known from PCs, is removable from the car radio or is disconnectable from it, and is connectable to

a data source, such as a PC or a home audio system.

Furthermore, for storing audio data in the memory of the car radio, it is advantageous if the memory includes a reading device for other storage media that are connected to the memory for transcribing audio signals stored on another storage medium to the memory. In this case, the hard disk can permanently remain in the car radio or connected to it if installed externally. This is particularly advantageous if the hard disk is either permanently installed in the car radio or in another part of the car such as behind an interior trim panel.

Especially in the case of a hard disk that cannot be removed or disconnected from the car radio at all or only with great difficulty, it is particularly advantageous if a coder is connectable between the reading device and the memory for the purpose of compressing audio data read from a storage medium for storing them in the memory. In this case, when storing the audio data in the memory in compressed form, the storage media to be analyzed by the reading device do not necessarily have to contain the data in compressed form. Rather, the compression may take place in the car radio, so that even conventional audio-CDs may be used as data media. The reading device does not have to be suited for reading storage media with compressed audio data either; a common CD-player, for instance, suffices.

A decoder, installed downstream from the memory, for converting the MP3-coded audio data permits their conversion into reproducible audio signals.

Drawing

Embodiments of the invention are presented in the figures and are explained in more detail below. Identical symbols represent identical elements.

Figure 1 shows a block diagram of the part essential to the invention of a car radio according to the present invention,

Figure 2 shows a block diagram of a memory for recording audio data, having a coder that may be installed upstream for data compression, and

Figure 3 shows a block diagram of a memory for recording audio data, having a decoder that may be installed downstream for converting audio data stored in compressed form into reproducible audio signals.

Description of the Exemplary Embodiments

An advantageous embodiment of a car radio 1 according to the invention is shown schematically in Figure 1 in the form of a block diagram.

Car radio 1 according to the present invention has a radio receiver 20, that is essentially known and therefore not further described, which receiver includes the means necessary for receiving and demodulating a radio signal. At the output of radio receiver 20, a radio program signal in the form of a stereo multiplex signal is available, obtained from a received radio transmit frequency by demodulation, containing audio signals for the left and the right audio channel.

The radio program signal, in other words the audio signal to be reproduced, is fed to a first input of a controllable switch 60. When switch 60 is appropriately triggered by a trigger signal, the radio program signal is able to be picked up at the output of controllable switch 60.

The output of controllable switch 60 is connected to an essentially known playback device 50 for audio signals. This device includes – as is generally known – the means required for playback of an audio signal, such as a stereo decoder for

isolating the left and right channels of the audio signal from the stereo multiplex signal, a sound-control device for manipulating the frequency response of the audio signal, such as in the form of an equalizer, a volume adjuster, one or more low-frequency amplifiers, and loudspeakers for playing back the supplied audio signal.

Additionally, the car radio has a control unit 40 that includes control elements 45 such as in the form of pushbuttons, rotary buttons or cursor control keys, for controlling its functions, as well as a display unit 70 for displaying its operational state, for instance, the name of a radio program currently received by the radio receiver. In the case of cursor control of the car radio, using cursor keys 45, display unit 70 is also used for displaying a cursor against the background of a one or multidimensional menu, from which functions and parameters of the car radio are selectable or adjustable via the cursor.

Finally, according to the present invention, the car radio includes a memory 10 for audio data in the form of a hard disk. The audio data stored on the hard disk may be read in response to a corresponding control signal and fed to the second input of controllable switch 60. When a corresponding control signal is applied to switch 60, the switch establishes a connection between its second input and its output, and thus with playback unit 50, so that the audio signals read out from memory 10 are played back. The hard disk may either be integrated into the car radio or be connected to it as an external device.

Above-mentioned elements 10, 20, 40, 50, 60, 70 communicate with a control 30 for controlling the functions of the device. The control is used, for instance,

- for converting user inputs at control unit 40 into control sequences for controlling the above-mentioned elements of the device

- for detecting operating states of individual components of the device and for generating operational state information displayable at display unit 70; in other words, for MMI-functions of the device, as well as
- for controlling internal sequences and functions of car radio 1.

Functions controlled by control 30 are, for instance,

- the determination of a radio transmit frequency assigned to the program in a program and frequency memory, and setting of the transmit frequency as the receive frequency at radio receiver 20, after selection of a desired radio program by the user via control unit 40,
- determination of an alternative, clearer radio transmit frequency transmitting the same program, and setting of this transmit frequency as the receive frequency at the radio receiver, in the case of a worsening of the reception of a selected receive frequency,
- display of the received radio program as a function of RDS-data or the selected frequency,
- generation of a control signal for switch 60 as a function of a user input via control unit 40, or during standby operation for receiving traffic information in case of playback of an audio signal from memory 10, when a traffic announcement is detected in the received radio program for preferential playback of the traffic announcement over playback of the audio signals from memory 10,
- generation of control signals for memory 10 for storing audio data in the memory for reading out of audio data from the memory in response to a corresponding user input via control unit 40,
- generation of control signals for manipulating the playback volume or the frequency response for an audio signal to be played back via the volume control or the equalizer of playback unit 50 in response to corresponding user inputs at control unit 40.

Memory 10 of car radio 1 according to the invention is configured according to a particularly advantageous embodiment of the invention as a hard disk, removable from the car radio, such as the kind of exchangeable hard disk known from personal computers. For this purpose it is equipped with detachable terminals 12 and 13 for connection to control 30 and to the second input of controllable switch 60, which terminals are advantageously arranged in a multipole connector in such a way that, when inserting hard disk 10 into car radio 1, terminals 12 and 13 automatically establish an electrical connection with corresponding counter-contacts of car radio 1.

When removed from the car radio, hard disk 10 may be connected via another terminal 11 – in the following also referred to as an input terminal – to an audio signal system such as a home stereo system for transcribing audio data to the hard disk. It may also be possible, however, to insert hard disk 10 into a PC for recording with audio data. For instance, a music CD inserted into a CD-ROM drive of a PC may be read out and the audio data stored there recorded on the hard disk. In this way, the user of the car radio, before going on a trip, may, for instance, transcribe a desired portion of his music-CD collection to the hard disk and listen to it during the trip. Here, the transcription of even larger quantities of data to the hard disk takes relatively little time due to the high reading speeds of today's CD-ROM drives and the high recording speeds of today's hard disks.

According to a further embodiment of the car radio, the latter has a reading device for additional storage media such as in the form of a CD-player. The CD-player's output is connected to the input of memory 10, in other words the hard disk, or connectable via a terminal 11, so that audio data, read-out from an audio-CD inserted in CD-player 80, can be transcribed to hard disk 10. This makes it possible for the user of the car radio, before going on a trip, for instance, to transcribe

a portion of his CD collection to the hard disk, that can then be listened to during the trip. Transcription of audio data to the hard disk is accelerated by a fast CD-player. Fast CD-players are available in the form of PC CD-ROM drives with currently up to 40x reading speeds.

In another advantageous embodiment – described below using Figure 2 – of the car radio according to the present invention, a compression stage 17 is or may be connected upstream from memory 10. This compression stage may be permanently looped into the signal path between additional terminal 11 of memory 10 and hard disk 15 or, as in the present case, may be capable of being looped into the signal path if need be. Compression stage 17 is used for compressing audio signal data supplied via additional terminal 11 of memory 10, such as according to the MP3-standard. This stores audio data in compressed form on hard disk 15 as the actual data memory.

In the case of the present embodiment, additional terminal 11 of memory 10 is connected to a code detector stage 16, which checks the data signal present at additional terminal 11 to see whether the signal is already compressed. For instance, if a PC is the source of the audio data, the audio data downloaded from the Internet may, for instance, already be in the MP3-format. On the other hand, when transcribing audio data from a standard audio CD to memory 10, the data is in uncompressed form. If the audio data are available in compressed form, code detector stage 16 feeds the signal present at additional terminal 11 directly to the hard disk 15 for storage. Otherwise, if the audio data signal at additional terminal 11 is available in uncompressed form, code detector stage 16 feeds it to compression stage 17 for compression and subsequent storage in compressed form on hard disk 15.

In response to a control command at control terminal 12 of memory 10, the audio data signal stored in compressed form on

hard disk 15 are read by the hard disk and fed to a decompression stage 18, which converts the compressed audio data signal into a decompressed audio data signal that may be picked up at output terminal 13 of the memory and fed to the playback device.

The embodiment of memory 10 shown in Figure 3 provides for the possibility of feeding the memory, via input terminal 11, uncompressed audio data signals such as those originating from a CD-player 80, as well as, for instance, audio data signals compressed according to the MP3-standard. These are stored unchanged on hard disk 15.

In this embodiment, hard disk 15 is connected on the output side to an additional code detector stage 19, which is comparable to code detector stage 16, which code detector stage 19 checks an audio data signal read by hard disk 15 to see whether the signal is in compressed or uncompressed form. If the audio data signal is available in compressed form, it is fed to a decompression stage 18 for decompression. The decompressed audio data signal may then be picked up at output terminal 13 of memory 10. Otherwise, if the audio data are present in uncompressed form on hard disk 15, they are fed directly to output terminal 13 of memory 10 while being read by additional code detector stage 19.

Code detector stages 16 and 19, as well as coder and decoder 17, 18, may be configured as part of memory 10 and thus be removable from the car radio together with memory 10, especially in the case of a memory 10 that is removable or disconnectable from car radio 1 as shown in Figures 2 and 3. In this case, terminals 11 and 13, as in the embodiment in Figure 2, are situated in the signal path upstream from code detector 16, or downstream from decoder 18, or in the embodiment in Figure 3, upstream from hard disk 15 or downstream from code detector 19 and decoder 18.

Above-mentioned elements 16 through 19 may also be configured as a part of the car radio itself and therefore remain in the radio even when disconnecting memory 10 from it. In that case, terminals 11 and 13 are located between code detector 16 and memory 10, which then is identical to hard disk 15, or between hard disk 15 and decoder 18 or additional code detector 19.

What is claimed is:

1. A car radio having a memory, in which audio signals may be stored,
wherein the memory (10) is configured as a hard disk.

2. The car radio according to Claim 1,
wherein the memory (10) is removable from the car radio (1).

3. The car radio according to one of the preceding claims, wherein the radio has a reading device (80) for additional storage media, the reading device is or may be connected to the memory (10) for transcribing audio signals stored on one or more additional storage media to the memory.

4. The car radio according to Claim 3,
wherein a coder (17) for compressing audio data read from a storage medium for storage in the memory (10) is connectable between reading device (80) and memory (10).

5. The car radio according to one of the preceding claims, characterized by a decoder (18) for decompressing audio signals stored in compressed form in the memory (10).

6. The car radio according to one of the preceding claims,
wherein the memory (10) is integrated into the car radio.

Abstract

A car radio is described having a memory in which audio signals may be stored, where the memory is configured in the form of a hard disk.

A hard disk as an audio signal memory offers the advantage of high storage capacity of about 15 hours of audio signal in CD-quality, with today's hard disks of about 8-gigabyte, while at the same time having small dimensions and low production costs.

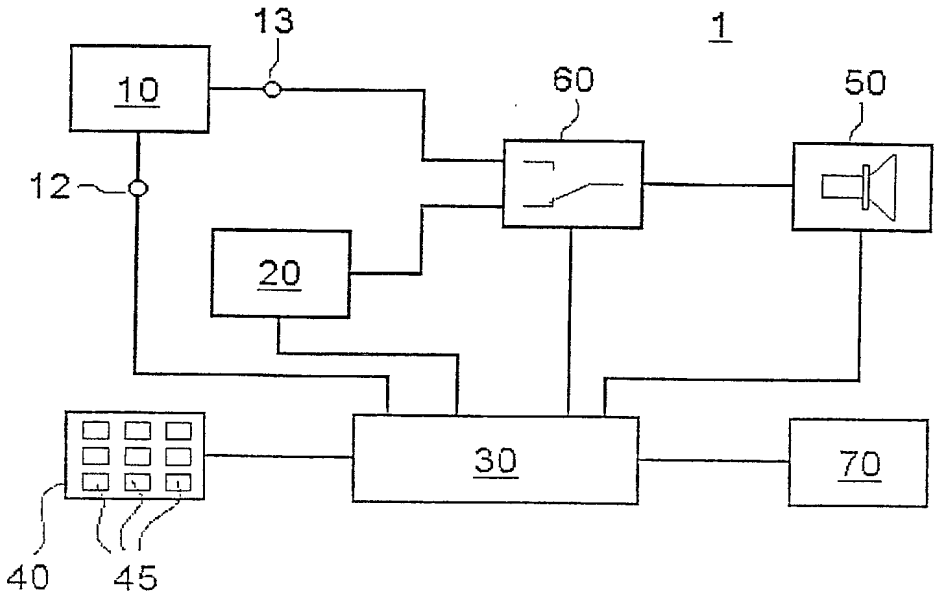

Fig. 1

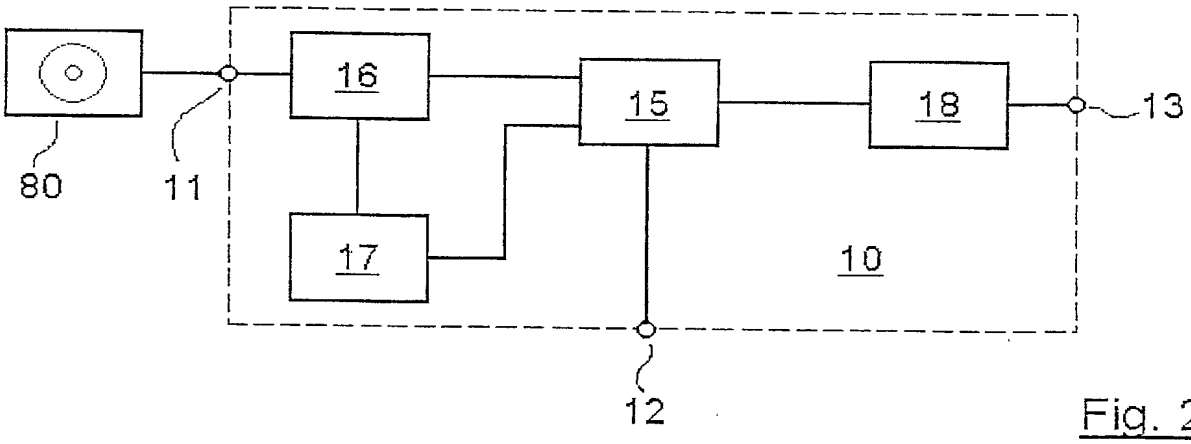

Fig. 2

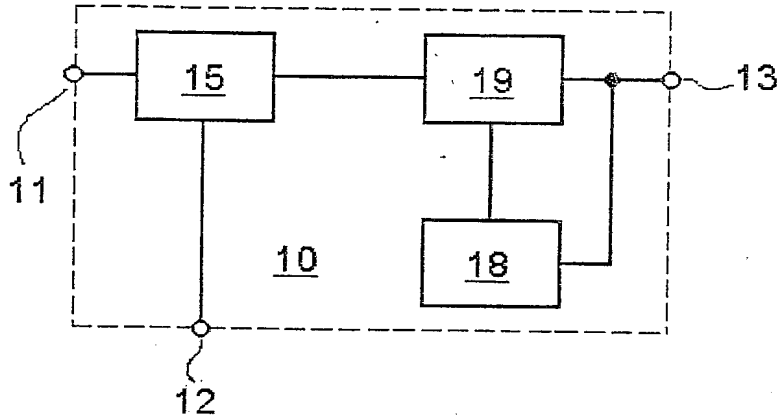

Fig. 3

10191/2270

COMBINED DECLARATION AND
POWER OF ATTORNEY FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below adjacent to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled **CAR RADIO HAVING A MEMORY FOR AUDIO SIGNALS,** and the specification of which:

[ ] is attached hereto;

[ ] was filed as United States Application Serial No. _____ on _____, 19__ and was amended by the Preliminary Amendment filed on _____, 19__.

[x] was filed as PCT International Application Number PCT/DE00/02681, on the 10th day of August, 2000

[x] an English translation of which is filed herewith.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a). I hereby claim foreign priority benefits under Title 35, United States Code § 119 of any foreign application(s) for patent or inventor's certificate or of any PCT international applications(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the

EL594613900

application(s) of which priority is claimed:

PRIOR FOREIGN/PCT APPLICATION(S)
AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. § 119

Country : Federal Republic of Germany

Application No. : 199 39 320.6

Date of Filing: 19 August 1999

Priority Claimed
Under 35 U.S.C. § 119 : [x] Yes [ ] No

I hereby claim the benefit under Title 35, United States Code § 120 of any United States Application or PCT International Application designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of Title 35, United States Code § 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations § 1.56(a) which occurred between the filing date of the prior application(s) and the national or PCT international filing date of this application:

PRIOR U.S. APPLICATIONS OR
PCT INTERNATIONAL APPLICATIONS
DESIGNATING THE U.S. FOR BENEFIT UNDER 35 U.S.C. § 120

U.S. APPLICATIONS

Number :

Filing Date :

PCT APPLICATIONS
DESIGNATING THE U.S.

PCT Number :

PCT Filing Date :

I hereby appoint the following attorney(s) and/or agents to prosecute the above-identified application and transact all business in the Patent and Trademark Office connected therewith.

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Full name of inventor **Matthew COON**

MW Inventor's signature _____ Date 14 March 2002

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